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STUDIES ON INDIAN COPEPODS 3. *NEARCHINOTODELPHYS*
INDICUS, A NEW GENUS AND SPECIES OF
ARCHINOTODELPHYID COPEPOD FROM INDIAN SEAS*

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Hansen (1923) obtained from *Phallusia obliqua* (= *Ascidia obliqua*) an interesting species of copepod which he named *Cyclopina phallusiae*. Hansen himself was uncertain about the correct systematic position of this copepod, for a species of the genus *Cyclopina* was never known to live within the ascidian. Lang (1949) suggested the creation of a new family Archinotodelphyidae to receive *C. phallusiae* Hansen and a new species of copepod which he gathered from *Pyura georgiana* Mchlsn during the Swedish Antarctic Expedition. He placed the two species in two monotypic genera, *Archinotodelphys* to contain his own new species and *Pararchinotodelphys* to include *C. phallusiae*. This was a fitting arrangement in view of the important and far-fetching suggestions he had already made regarding the classification of copepods (Lang, 1948).

IUg (1955) discovered a second species of *Pararchinotodelphys* from the branchial cavities of *Styela partita* caught off Marthas Vineyard, Massachusetts. He provided an excellent discussion regarding the systematic position of all the three species and that of *Pseudocyclopina belgicae* Giesbrecht which was considered as congeneric with *Cyclopina phallusiae* by Lindberg (1952). In fact Lang's account of his new family and the two genera contained therein were very short and it was IUg who enlarged our understanding of this group.

Pararchinotodelphys phallusiae was obtained during the Danish Ingolf Expedition; Lang obtained specimens of *Archinotodelphys typicus* from the Antarctic; and IUg reported *P. gurneyi* from north-west Atlantic. The archinotodelphyid copepod described below is collected from the south-east coast of India and appears to require a new genus and species to accommodate it. The male is not known for any of the earlier species. In the present case a fair number of males and females have been obtained and efforts have been made to elucidate points of sexual dimorphism in this primitive family. In describing the various morphological characters I have mainly adopted the terminology suggested by Gooding (1957) with some alterations (Ummerkutty, 1960). There is no absolute agreement between the various investigators on the homology of the constituting parts of the cephalosomal appendages of the copepoda. The terms 'protopod', 'endopod' and 'exopod' are used in this paper rather in a descriptive sense than to indicate any strict morphological origin. These terms have been employed not only to describe the constituting parts of the swimming legs but also for those of the cephalosomal appendages of the adult animals.

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Family: ARCHINOTODELPHYD:AE LANG (Lang, 1949, p. 3.)

Genus : *Nearchinotodelphys* nov.

The prosome consists of four segments : a cephalothorax formed by the fusion of the cephalosome and the first pedigerous segment and three free metasomal segments. The urosome consists in the female of the segment bearing the fifth legs, the genital segment and three abdominal segments ; in the male it consists of the fifth leg-bearing segment, the genital segment and four abdominal segments. The antennule is 15-segmented in the female and 14-segmented and geniculate in the male. The antenna is 4-segmented, the last segment bearing a strong claw accompanied by a number of setae. The mandibular palp has a 2-segmented endopod and a 4-segmented exopod. In the maxillule the endopod is 2-segmented while the exopod is only 1-segmented. The maxilliped is 3-segmented. The natatory legs have both rami 3-segmented. The fifth legs are 2-segmented ; 4 setae are borne on the terminal segment and 1 on the basal segment.

Genotype : *Nearchinotodelphys indicus* sp. nov.

Nearchinotodelphys indicus sp. nov.

Material examined—The material of the present study was obtained from the mantle cavity of a boring bivalved molluscan, *Lithophaga stramineus**. The specimens were first noticed by Dr. E. G. Silas who kindly passed them over to me. There were 11 females and 10 males. A few of them were slightly damaged but the majority of them were in good condition so as to permit a thorough examination. It is interesting to note that although the two sexes were present more or less in equal numbers, no egg-carrying female or naupliar or copepodite stages were found. The type specimens, the holotype, the allotype and the paratypes are deposited in the Reference Collection Museum of the Central Marine Fisheries Research Station, Mandapam Camp and bear the registered Nos. J 511/2, J 512/2 and J 513/2 respectively.

FEMALE

In general appearance the female (Fig. I, 1) resembles the three other known species except that in the present case the cephalosome and the first pedigerous segment are fused to form a cephalothorax. The latter is the widest part of the body and is almost twice as wide as the last metasomal segment and three times wider than the widest part of urosome. There is a distinct cap-like rostrum, narrower at the base. There are only 3 metasomal segments, diminishing in width posteriorly. The urosome consists of 5 segments : the fifth leg-bearing segment, the genital segment and 3 abdominal segments, the last of which bears a pair of caudal rami. The genital segment is the longest and shows signs of division laterally. The three abdominal segments are more or less of equal dimensions and distinctly smaller than the genital segment. The fifth leg-bearing is the widest of all urosomal segments ; the posterior half of this segment is narrower than its anterior half which carries the fifth legs; in preserved specimens a part of this anterior half is covered over by the last prosomal segment.

* Kindly identified by Mr. K. V. Rao.

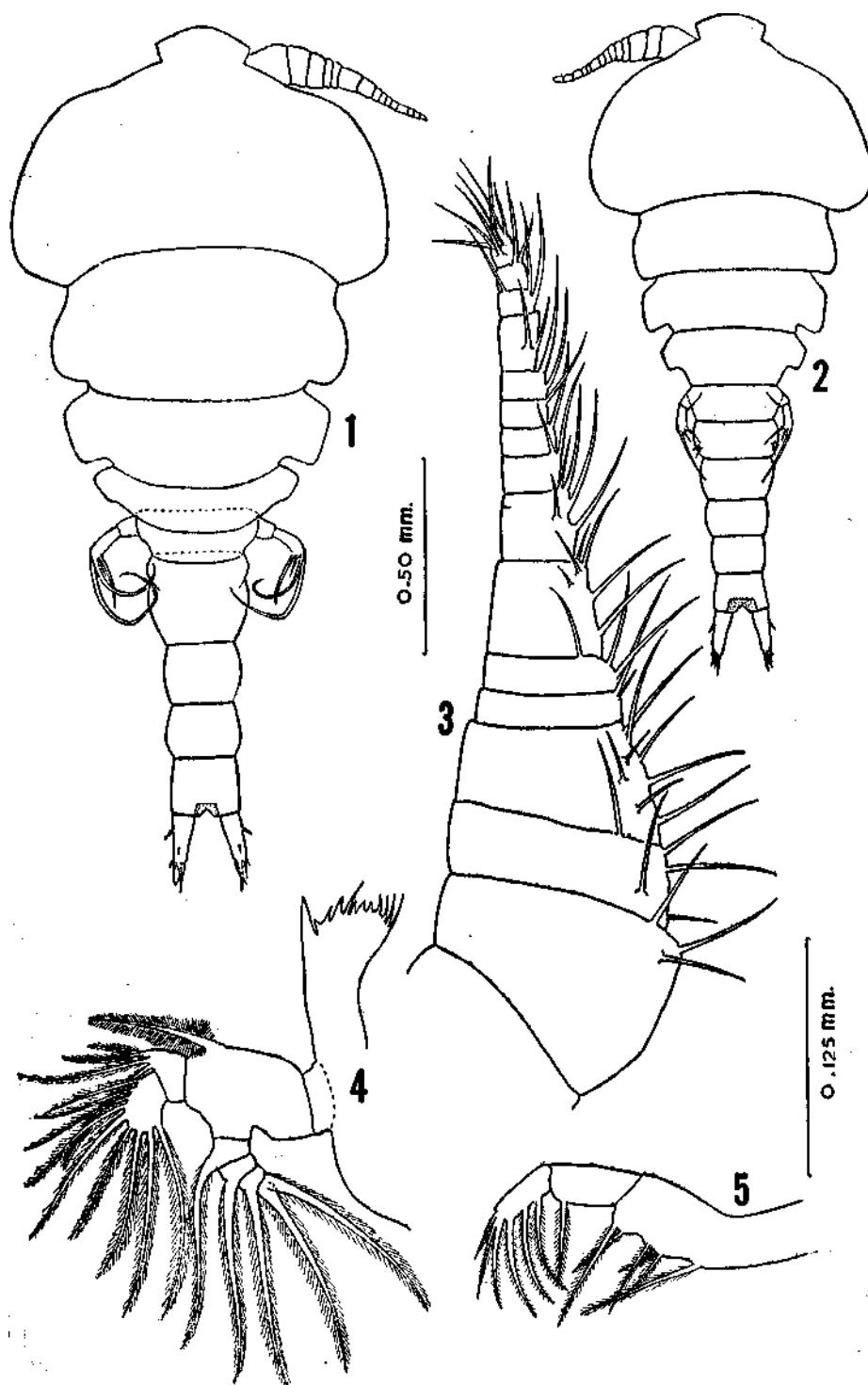


FIG. I.

1. Female, adult, dorsal view.
2. Male, adult, dorsal view.

3. Female, adult, antennule.
4. " " mandible,
5. " " maxilliped.

The caudal ramus calls for some comments. It is very different from those described for all the three known species. In the earlier species it is more or less cylindrical and at least one-half longer than the last abdominal segment and bears 4 fairly long apical setae, besides one (in *Archinotodelphys typicus* and *Pararchinotodelphys phallusiae*) or two (in *P. gurneyi*) short setae at some distance from the apex. In the present case, the caudal ramus is very short, just as long as the last abdominal segment and the setae are much shorter, the longest seta being only just a little more than half the length of the ramus itself. Further the setae are thicker at the base and taper posteriorly. In the earlier species the setae are long and slender and more or less of uniform thickness.

The proportionate lengths of the prosome and the urosome are 59 : 41.

Antennule (Fig. I, 3)—Antennule is very short, extended laterally in the natural position and hardly reaching the posterior margin of the cephalothorax, if held backwards. There are only 15 segments in the antennule and the proportions of the constituting segments are given below (All segments are measured along the middle line).

1	2	3	4	5	6	7	
17.3	8.0	11.7	4.4	4.8	11.2	8.7	4.8
9	10	11	12	13	14	15	
3.5	3.5	3.5	7.0	3.0	3.0	5.6	= 100

All the segments are provided with many setae except the 10th and 11th which are provided with one seta each. The proximal segments are much wider than the distal ones, the first segment being 8 times as wide as the 15th and the segments between them tapering gradually to the distal end. The 7th segment shows a slight sign of lateral division, but otherwise the segments are normal. No aesthetask or sensory filament is borne by any segment. The lengths of the different segments are uneven; the first segment is the longest; second, third, sixth and seventh are of moderate length with two short segments, the fourth and fifth segments, inserted between them. Eighth to fifteenth segments are short and subequal, excepting the 12th which is almost double the length.

Antenna (Fig. II, 7)—It is 4-segmented. In the first segment (basal) there are two juxtaposed setae of equal length, bearing hairs throughout their lengths. This condition is found only in *A. typicus* among the known species. The second segment is devoid of any seta. In the third segment there are two long setae at the outer distal margin and one short seta just before the mid-length. The last segment gives the appearance of being segmented; whether the two halves represent actual segments or the division is only apparent is not clear; probably the division is superficial for no constriction is observed in the region of the partition. Further, the proximal half is devoid of any seta. The last segment bears five setae and one claw on the apex and a very short seta on the ventral face at about one-third the proximal length of the segment. Of the apical setae, the distal two are very long and bent towards the claw; the other three terminal setae are much shorter and rather straight. The claw is very large, broader at the base than at the apex and characteristically bent.

Mandible (Fig. I, 4)—The mandible is normal and is identical to that described for earlier species. It is a fairly massive structure having a masticatory blade and a biramous palp. The former is denticulated at the inner edge, the teeth becoming

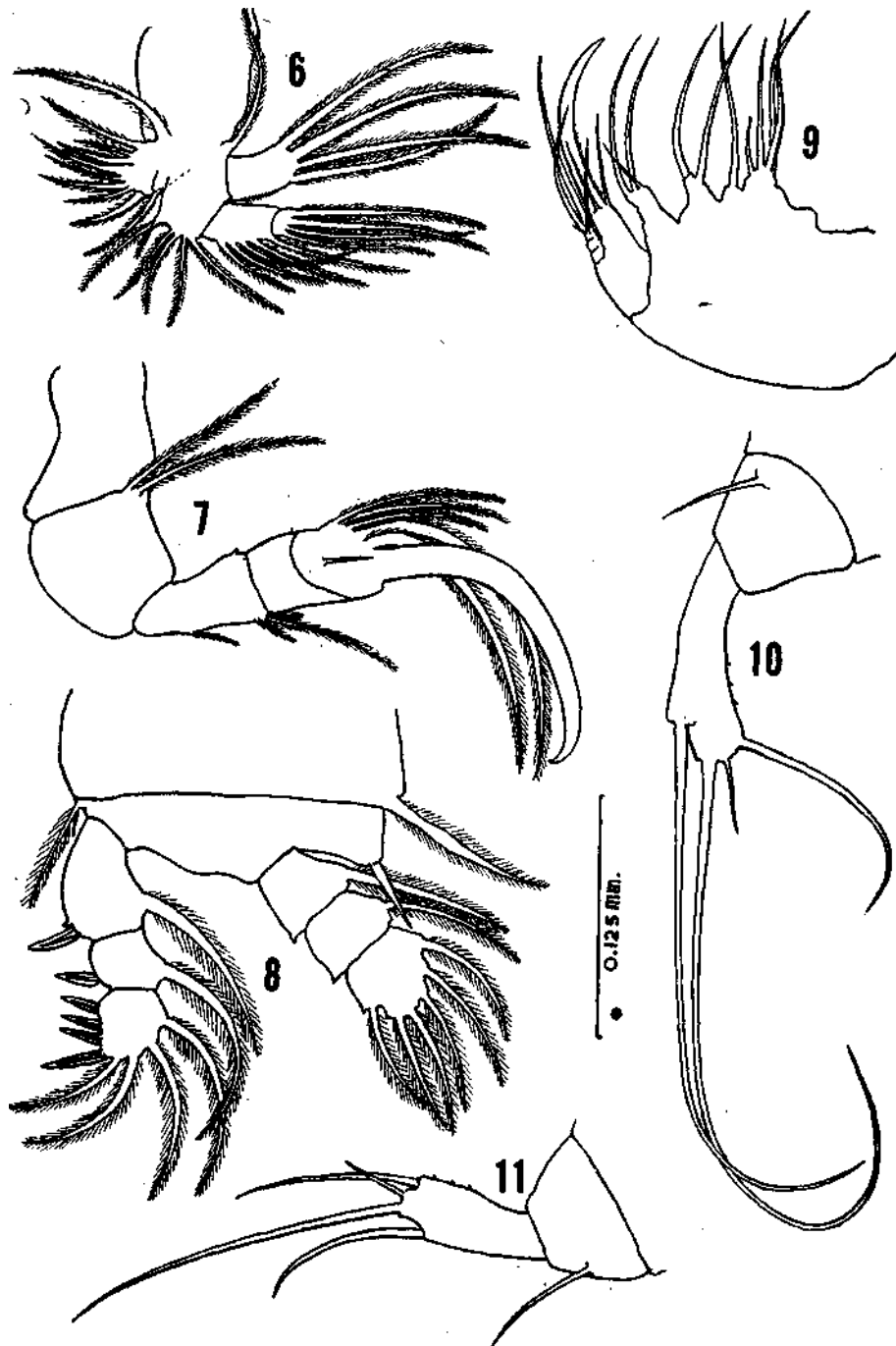


FIG. II.

- 6. Female, adult, maxillule.
- 7. " " , antenna.
- 8. " " , first swimming leg.

- 9. Female, adult, maxilla.
- 10. " " , fifth leg.
- 11. Male, adult, fifth leg.

more seta-like on one side and stout and strong on the other. The palp of the mandible consists of a protopod and two rami. The protopod is quite large and carries only a single seta, heavily setiferous and placed towards the distal margin. The endopod is 2-segmented, the basal segment carrying four setae. The distal segment bears nine setae which are arranged continuously along the inner, lateral and apical margins. The exopod is 4-segmented. Each of the first three segments bears one long seta, and the last two setae. All the setae are plumose.

Maxillule (Fig. II, 6)—A protopod, an exopod and an endopod can be distinguished in the maxillule. The protopod is a complicated structure and has been discussed in detail by Illg (*loc. cit.*). I am inclined to accept his interpretation and the following description, is offered. The protopod is apparently bimerous. The basal protopod segment probably represents in the present case a fusion of the two endites. The proximal one is rather massive, bearing medially along its margin nine setae (some of which look more like spines) of varying proportions. The proximal-most seta is striking in that it is separated from the rest and is very long having a peculiar curve. The distal endite is very small and peg-like, bearing a solitary seta at the apex. The basal protopod segment also supports at the base of the exopod a protuberance carrying a seta. This is interpreted as representing a coalesced epipod.

The distal protopod segment is rather simple, but quite expanded. Its apparently outer lateral margin bears both the endopod and the exopod. On the opposite margin it bears two groups of setae; the proximal group consists of one long and one short seta and the distal group of four setae of more or less equal length. The endopod is 2-segmented and the exopod is 1-segmented. The former bears five setae on the proximal segment, arranged all along its entire inner margin and four on the distal segment set apically. They are continuous and about equispaced and show gradual increase in length from the basal to the apical setae. The exopod is rather rectangular in shape, as large as the endopod but bearing only four setae, two of them apical and the other two subapical on either side. These setae are the longest of the maxillule and are plumose.

Maxilla (Fig. II, 9)—Here the first segment bears four groups of setae, each probably representing one endite. The first group bears four setae one of which is spiniform and shorter than the others. The second endite bears a long solitary seta. On the third endite there are two long apical setae and on the fourth there are three setae two of which are very long and the third spiniform and short. The second segment is produced medially as a heavy, tapering, slightly curved spine. At the base of this spine there is a pair of small setae, a feature not found in any other known species of the genus. The distal region is 3-segmented, each segment bearing a single longseta. It is a far smaller region, forming only a fragment of the whole appendage.

Maxilliped (Fig. I, 5)—This is 3-segmented. The basal segment is the longest, being longer than the other two segments combined. It carries three protuberances on the medial margin. The first is at about the mid-length of the segment and a single seta is borne on it. The second protuberance is equidistant from the first and the third and bears four setae of varying lengths. The third one is almost at the distal medial angle of the segment and is provided with two setae. The second segment is small, less than half the length of the basal and its ornamentation consists of a single seta borne subterminally on the medial margin. The last segment is the smallest both in length and width and bears six setae graduated in length from the base to the distal end.

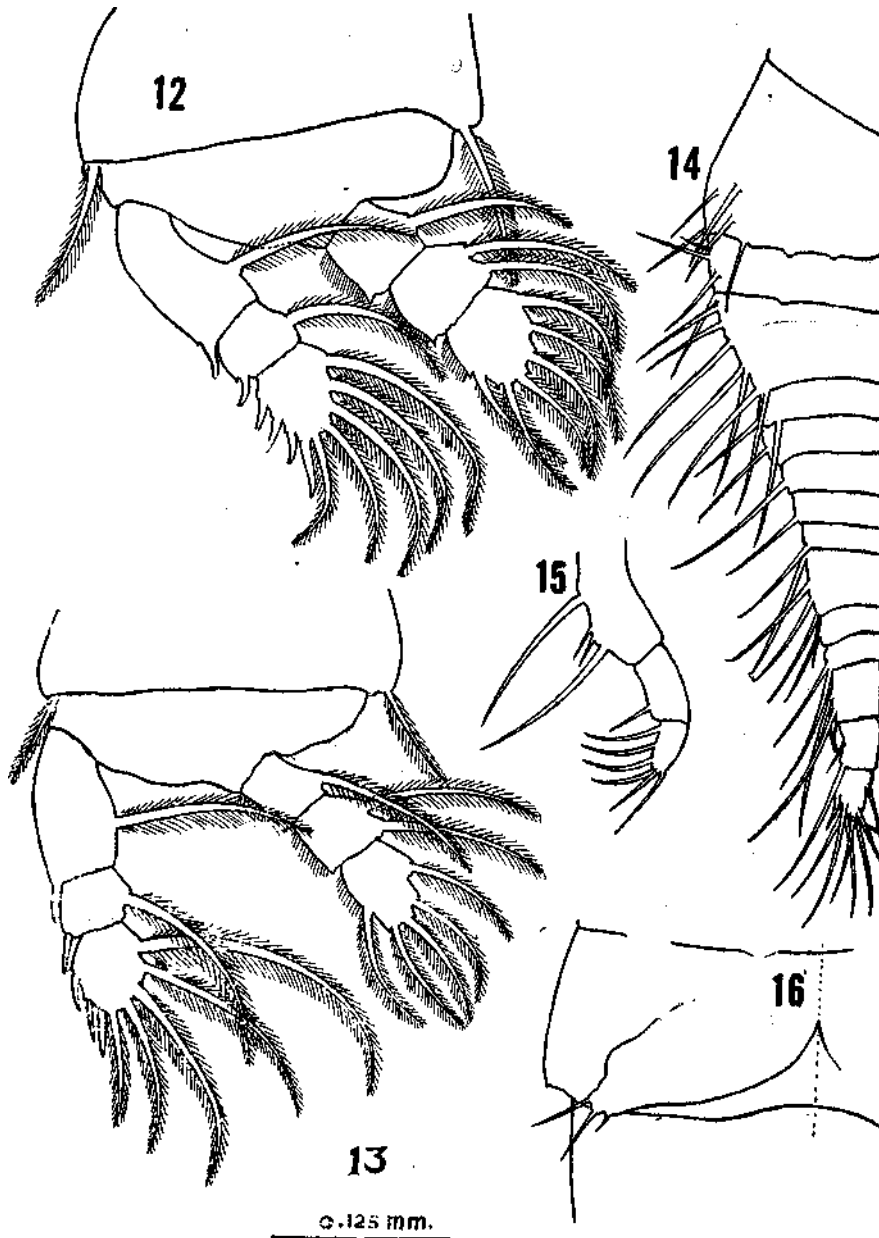


FIG. III.
 12. Female, adult, second leg.
 13. " " fourth leg.
 14. Male, adult, antennule.
 15. " " maxilliped.
 16. " " genital segment, ventral view.

Swimming legs (Fig. II, 8 and Fig. III, 12 & 13)—These appendages exhibit a similar pattern of organisation except in the setation of the various segments which is given below :

	Protopod				Endopod								Exopod						
	1		2		1		2		3		-		1		2		3		
	Si	Se	Si	Se	Si	Se	Si	Se	Si	St	Se		Si	Ss	Si	Se	Si	St	Se
PI	1	0	I	1	1	0	1	0	3	2	1		1	I	1	I	3	1	IV
P2	1	0	0	1	1	0	2	0	3	2	1		1	I	1	I	4	1	IV
P3	1	0	0	1	1	0	2	0	3	2	1		1	I	1	I	4	1	IV
P4	1	0	0	1	1	0	2	0	2	2	1		1	I	1	I	4	1	in

(Si, St and Se represent the internal, terminal and external margins of the constituting segments and PI—P4 represent the first to the fourth swimming legs. Spines are indicated by the Roman and setae by the Arabic numerals). The appendages are strongly built, biramous, each ramus being composed of three segments. In size the first legs are the smallest. It is borne by the cephalothorax, while the succeeding legs are each borne by a separate metasomal segment. In first legs the protopod I carries a single seta at the inner distal angle ; the protopod II a simple spine at the distal inner angle. The segments of the endopod are subequal in size and are more or less of equal length and width. In the exopod the first segment is the longest and second the shortest; the former is narrower at the base. The second and third legs are alike in all respects. The first protopod is large and carries one seta at the distal inner angle. The second protopod segment carries a seta on its outer lateral margin. The segments of both rami resemble those of the first legs and differ only in ornamentation. The fourth leg although built on the same pattern gives a narrower appearance of the constituting segments of both the rami. The spines of the exopod segments are specially noticeable in that they are rather slender and straight and do not possess the partial curvature of the tip, a feature present in the spines of first, second and third exopods.

Fifth leg (Fig. II, 10)—The fifth leg is borne by the first urosomal segment and is bimerous. The proximal segment is stout, broader at the base than at the apex and bears a single seta at its one-third length. The narrower tip of the proximal segment merges into the base of the distal segment which is broader at its distal region. There are four setae on the distal segment, two apical and two subapical. Of the latter, one is borne on a protuberance in the distal outer side and is very long, about two times longer than the entire fifth leg ; the second seta is on the inner distal margin and is much shorter, only a little more than one-third length of the outer seta. The apex bears the shortest and the longest of the setae. The latter is one-fifth longer than the outer subapical seta and the former is extremely short, just a little more than half the length of the seta on the proximal segment of the fifth leg. All the setae bear minute hairs all along their lengths. Three bristles are found on the inner margin of the distal segment of the fifth leg.

Genital apertures (Fig. IV, 1)—The genital apertures are not described for any of the earlier species of this family. It is probably because of the limited number of specimens available to the investigators, The genital apertures in the present

species are very widely separated. They are set about one-third the proximal length of the genital segment and more or less ventro-laterally. The two apertures are connected by a narrow groove that run across the segment. The apertures are provided with minute spinules, probably guarding them.

MALE

The male (Fig. I, 2) is much smaller than the female, but is very similar to it. The differences noticed in the structural details are in the antennule, the maxilliped, the fifth leg and in the urosome. In other aspects there is absolute similarity between the male and the female except for the smaller size of the former.

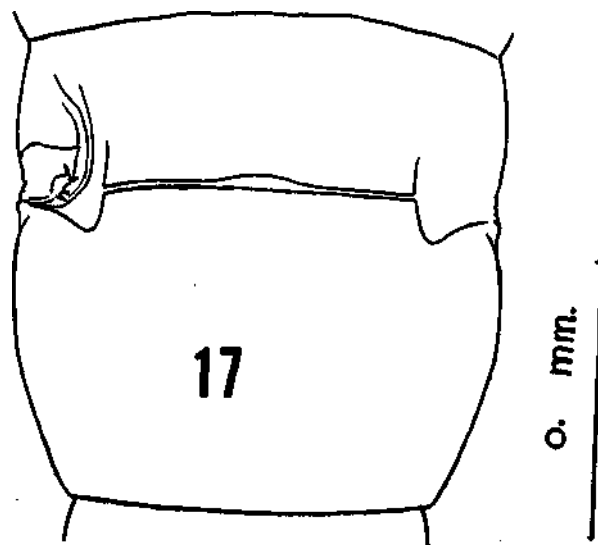


FIG. IV

17. Female, adult, genital segment, ventral view.

Antennule (Fig. III, 14)—The structure of the antennule may really be termed primitive for the geniculation found here is one of the simplest among the cyclopoids and the points of departure from the female antennule are not many. Both the left and the right antennules are built on the same pattern and each consists of only fourteen segments. The proportionate lengths of the constituting segments are as follows (All measured through the mid-line).

1	2	3	4	5	6	7	8
20.2	7.4	10.6	5.3	5.3	5.8	4.3	3.7
9	10	11	12	13	14		
7.4	4.3	4.3	8.0	6.9	6.5	..	- 100

It can clearly be seen that only the first five proximal segments have the same proportionate dimensions as those of the female antennule ; sixth and seventh segments which are fairly large in the female are here, only as large as the fourth and

fifth ; the eighth segment is smaller than any of the four earlier segments; the ninth segment is quite large and is equivalent to the tenth and eleventh combined; the last three segments are subequal and are geniculated. The twelfth segment bears a spine on its distal posterior margin and two fairly long setae on the same side. The thirteenth segment has a characteristic concavity on its anterior margin and bears a small straight spine at the depression and a long seta at the distal anterior angle. The last segment is profusely setated ; one seta is borne at one-third proximity, and the others at the distal region. There is a spine at half the length on the anterior margin. The length of the antennule in relation to the cephalothorax is similar to that in the female.

Maxilliped (Fig. III, 15)—This appendage shows variations from that of the female only in the proximal segment. While in the female it is longer than the combined lengths of the distal two segments, here it is distinctly smaller than that. It differs also in the setation : there is a solitary seta just beyond the one-third the proximal length and one long and two short spine-like setae at about two-third the length.

Fifth leg (Fig. II, 14)—The structural deviations of the male fifth legs are rather few. In the basal segment the position of the seta appears to have changed ; it is seen just beyond the middle length. In the distal segment the setae give an entirely different appearance. While the outer subapical seta in female is about two times the length of the entire fifth leg here it is only just a little longer than the distal segment of the latter ; the outer apical seta is again considerably reduced in length. Here also it remains the longest seta and is about twice as long as the outer subapical seta, but its length in proportion to that of the fifth leg itself is far less. Further both these setae lack their characteristic curved shape of the female. The reduction in length of the other two setae, namely, the inner apical and inner sub-apical, are only proportionate to that of the appendage itself. The three bristles found on the inner margin of the distal segment of the females are also present in the male.

Urosome—It is 6-segmented, consisting of the fifth leg-bearing segment, the genital segment and four abdominal segments. The segments are graduated, the first segment being the widest. The latter and the genital segment are more or less of equal length. On the ventral side of the genital segment is present what is generally called the genital armature (Fig. III, 16) or the vestigial sixth pair of legs. The spines of this appendage are faintly seen from the dorsal side but the structural details can be studied only from the ventral side. It is peg-like, one on either half, occupying a major portion of the ventral surface of the segment and orientated more or less diagonally. There are three spines on the posterior tip of it; the inner most is very small and the outer two are long and sub-equal. The four abdominal segments are barrel-like and approximately of equal length. The last one bears the caudal rami which show no speciality.

DISCUSSION

Both Lang (1949) and Illg (1955) have stated that in the species they described the prosome consists of the cephalosome and four free leg-bearing segments and that the host animal is an ascidian. The present species differs from both these conditions on which so much stress has been made by Lang (*be. cit.*) when he created the new family Archinotodelphyidae and the two genera contained therein. In accordance with *Cyclopinella* the first leg-bearing segment is free in *Archinotpdef-*

phys and *Pararchinotodelphys*. But they differ from each other in the number of segments of the urosome. While *Archinotodelphys* has a urosome of six segments *Pararchinotodelphys* has only five segments in the urosome, a feature which relates the former genus to Notodelphyidae.

In the present example the cephalosome and the first pedigerous segment are fused; this is a character which directly relates it to many Cyclopinidiformes and Notodelphyidiformes and which is customarily held significant at a generic level (*vide* Sars, 1918, p. 16). The occurrence of the species in a molluscan host instead of the ascidian in unison with its relatives is another important fact in the evolution of the host-parasite relationship in this group of animals. *Nearchinotodelphys indicus* is also notable in that while it has developed its own specialities in many features it combines in it many morphological characters of both *Archinotodelphys* and *Pararchinotodelphys* thus making it difficult to assign it to either of the two genera. One gets the impression that if the present species does not represent a new genus the only other alternative will be to place all the four known species in a single flexible genus, *Archinotodelphys* Lang. It is probably more convenient and reasonable to treat the known four species as representing a single old genus with tendencies to specialize in various directions rather than to treat them as already specialized entities. The genus, in such a case, will combine in it all the characters of the family Archinotodelphyidae. However this procedure is not adopted here for the male is still unknown for the three earlier species. The degree of geniculation of the male antennule is an important criterion of generic distinction amongst the copepods and therefore, we have to await the descriptions of the males of these earlier species before proposing a merger of the existing genera as well as the present species into a single genus, *Archinotodelphys* Lang (1949).

Morphological specialities of N. indicus—In all the discussions of the comparative morphology of the three earlier species and the present one, the male is omitted for, it is not known in the former cases. The fusion of the cephalosome and the first pedigerous segment is already discussed. In the antennule there are only fifteen segments in the female and fourteen in the male on both right and left sides. The female antennule is 17-segmented in *Archinotodelphys* and 16—or 17—segmented in *Pararchinotodelphys*. In the antenna the structure of the terminal claw deserves some attention. In *P. phallusiae* it is described as one among the setae 'which in reality is somewhat small spiniform and very curved hook' (Hansen, *loc. cit.* p. 5). In the diagram it appears to be hardly one-third the length of the last antennal segment. In *P. gurneyi* it is moderately long, having the same length as the terminal antennal segment. A similar situation is found *A. typicus*. In all these cases the claw is rather weak. In *N. indicus* it is very strong and stout, being as long as the third and fourth antennal segments combined; and it has got a characteristic curved posture. It may also be noted that the distal two setae are similarly curved and are of the same length as the claw while the proximal three setae are only less than half the length and possess no special bent.

Fifth leg of *A. typicus* is very short, only about one and a half times as long as wide and carrying three apical and one middle seta. Basal segment does not bear any seta. In *P. phallusiae* too it is short, distal segment about two times as long as wide and carrying two apical and two subapical setae; the basal segment also carries a seta. In *P. gurneyi* the fifth leg is fairly long, the distal segment being about three times longer than wide and carrying two apical, one sub-apical and one middle seta; the basal segment bears one seta. In all these cases the fifth leg is more or less cylindrical and the setae borne by it are as long as or a little longer than the distal segment. In the present case there is great difference in the dimensions of the proximal and distal segments of the fifth legs. While the proximal segment is very

broad at the base tapering gradually to the distal tip, a reverse state is found true in the case of the distal segments : a narrower basal region increasing in breadth to the distal part. Further two of the setae borne by the distal segment are very long, one of them being about three times longer than the entire fifth leg and the other a little shorter.

In the structure of the caudal rami, *N. indicus* differs from all the three other species; while it is at least one and half times as long as the last abdominal segment in all the earlier species, it is hardly as long as the last abdominal segment in the present case. Further while in the known species the setae on the ramus are fairly long, some of them being as long as or longer than the ramus itself, it is very much shortened in *N. indicus* : the longest seta is just half the length of the caudal ramus.

Resemblances with Archinotodelphys—In *Archinotodelphys* the basal segment of the antenna is with two juxtaposed setae on the outer distal angle and with one seta on the inner angle. In the two species of *Pararchinotodelphys* there is only one fine seta instead of the two juxtaposed ones. However, in *P. phallusiae* a stout seta is borne separately at the inner angle. In *N. indicus* the condition is similar to that of *A. typicus* but the separate seta on the inner angle is lacking.

Illg (*loc. cit.*) has pointed out the possibility of differences at generic level in the armature of maxillule. It is doubtful whether any set limit can be placed at generic level on the structural pattern of maxillule in the family Archinotodelphyidae. However, the maxillule of the present species resembles very much that of *A. typicus*. In a sense *P. phallusiae* also approximates with that of *A. typicus* in the structure of the maxillule. The condition in the former may well be considered somewhat intermediate between *P. gurneyi* on the one hand and *A. typicus* and *N. indicus* on the other.

In *P. gurneyi* the maxilla is 6-segmented, the first two basal segments bearing two setiferous endites each. The third segment as in all other known species of this family is produced into a strong spine. There are four free segments in the distal region. In *P. phallusiae*, however, the situation is different: the two basal segments are fused and together bear four endites. The process of fusion has extended to the distal region also where all the four segments are fused together forming a large segment bearing a number of setae. The middle segment bearing the spine is, however, quite distinct. In *A. typicus* the two basal segments are fused and together bear four endites; the distal region, however, is 2-segmented. Thus, in the case of maxilla also the present species has more kinship with *Archinotodelphys*.

Resemblances with Pararchinotodelphys :—In the number of segments of the urosome *N. indicus* approximates more with the species of *Pararchinotodelphys*. In these, it is 5-segmented and consists of the fifth leg-bearing segment, the genital segment and three abdominal segments, the last of which bears a pair of caudal rami. This is an important criterion on which *Archinotodelphys* is separated from *Pararchinotodelphys* and which the latter shares with *N. indicus*.

The structure of the maxilliped in *N. indicus* resembles that in *Pararchinotodelphys*. In both species of this latter genus it is 3-segmented as it is in the present case. The similarity is found also in the number of setae borne by different segments.

Notes on the family Archinotodelphyidae—Lang (*loc. cit.*) thus defined the family Archinotodelphyidae : 'General form as in *Cyclopinella* G. O. Sars. First leg-bearing segment free, Antennae with one apical claw accompanied by a number of

setae. No brood-pouch, the eggs being carried in two dorsal sacs.' It is obvious that in order to receive *N. indicus* into this family an important alteration is to be made in its definition. The archinotodelphyids are distinguished from the cyclopinids by the presence in the former of a claw on the terminal antennal segment; they are separated from the notodelphyids by the facts that eggs are carried in two dorsal sacs and that no known notodelphyid antenna shows the sub-division of the terminal portion into the clear cut segments found throughout the archinotodelphyids. The fused or free state of the first pedigerous segment cannot be considered as a character of the family for in *N. indicus* it is fused with the cephalosome while in all earlier species it is free from the latter. In the fusion of the cephalosome with the first pedigerous segment and in the extremely high development of the terminal hook of the antenna, *N. indicus* tends more towards the notodelphyid pattern than any other related species. The cyclopinids is thought of as the parental stock and the notodelphyids as the descendant group; the archinotodelphyids are somewhat intermediate but aberrant group and 'the group as a whole exhibits a complex of primitive and advanced characters with no one member corresponding to the demonstrable archetypal requirements.' The discovery of this new species, *N. indicus*, with many morphological deviations and combinations as well as a profound change in the host preference probably adds to the complexity of the problem of their evolutionary lineage.

The following key to the identification of the various genera and species is rendered in compliance with the systematic procedure adopted in this paper; however, the male is omitted from the key.

KEY TO THE IDENTIFICATION OF FEMALES :

1. Prosome consists of a cephalosome and four free leg-bearing segments; host is an ascidian

Prosome consists of a cephalothorax, formed by the fusion of the cephalosome with the first leg-bearing segment and three free leg-bearing segments; host is a mollusc.
 *Nearchinotodelphys* g. nov. (only one species, *N. indicus* sp. nov. is known).

2. Urosome consists of six segments : the fifth leg-bearing segment, the genital segment and four free abdominal segments; basal segment of the antenna carries two juxtaposed setae. *Archinotodelphys* Lang, 1949.
 (only one species, *A. typicus* Lang, 1949 is known).

Urosome consists of five segments: the fifth leg-bearing segment, the genital segment and three free abdominal segments; basal segment of antenna carries only one seta instead of the two juxtaposed ones. *Pararchinotodelphys* Lang, 1949.

The genus consists of two species :

Antennule 17-segmented; maxilla 3-segmented; the terminal segment of the endopod of fourth leg bears two inner, one terminal and one outer setae (as shown in the figure) *P. phallusiae* (Hansen, 1923).

Antennule 16-segmented; maxilla 6-segmented; the terminal segment of the endopod of fourth leg bears two inner, two terminal and one outer setae.
P. gurneyi Illg, 1955.

SUMMARY

Nearchinotodelphys indicus, a new genus and species of cyclopoid copepod, belonging to the family Archinotodelphyidae, is described in detail. Only three other species have so far been assigned to this family, all of them being known only from the female sex. *N. indicus* is represented by both the sexes.

The points of similarities and differences between the known representatives of Archinotodelphyidae are discussed briefly : *Nearchinotodelphys* differs from both *Archinotodelphys* Lang and *Pararchinotodelphys* Lang in a number of characters but also combines in it many other features of both these latter genera.

The cephalosome and the first pedigerous segment are free in all the earlier species whereas they are fused in *N. indicus*. Further while the ascidian has been the host of the earlier forms, *N. indicus* is harboured by a mollusc. These characters have been incorporated in the definition of the family Archinotodelphyidae.

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